Universiti Malaysia PAHANG
Engineering • Technology • Creativity

SUPERVISOR'S DECLARATION

I/We* hereby declare that I/We* have checked this thesis/project* and in my/our* opinion, this thesis/project* is adequate in terms of scope and quality for the award of the degree of *Doctor of Philosophy/ Master of Engineering/ Master of Science in Bachelor of Civil Engineering

(Supervisor's Signature)

Full Name : DR. GUL AHMED JOKHIO

Position : SENIOR LECTURER

Date : 19 JUNE 2017

(Co-supervisor's Signature)

Full Name :

Position :

Date :

Universiti Malaysia PAHANG
Engineering • Technology • Creativity

STUDENT'S DECLARATION

I hereby declare that the work in this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Malaysia Pahang or any other institutions.

(Student's Signature)

Full Name : MUHAMMAD AIZUDDIN BIN MOHAMMAD

ID Number : AA13082

Date : 19 JUNE 2016

PROPERTIES OF CEMENT BRICK CONTAINING COCONUT HUSK FIBER AS PARTIAL SAND REPLACEMENT TITLE

MUHAMMAD AIZUDDIN BIN MOHAMMAD

Thesis submitted in fulfillment of the requirements
for the award of the
Bachelor Degree in Civil Engineering

Faculty of Civil Engineering and Earth Resources

UNIVERSITI MALAYSIA PAHANG

JUNE 2017

ACKNOWLEDGEMENTS

First of all I would like to give thanks my supervisor, Dr. Gul Ahmed Jokhio for his help in my effort to complete the research. He has shown encouragement and share knowledge and guided me to do this research. He has provide a lot of assistance from the beginning to the end and this has make me very thankful for having such a good supervisor.

I also would like to thanks my parent for all their support and encouragement for me to pursue my dream. Without their help, I would never become who I am today. I will try my best to make them proud of me. That is the only way I can make their effort and sacrifice worth it.

I also would like to thanks friends and all those who had contributed for this research either directly or indirectly. This really means a lot for me. I really appreciate every help that I have received from the beginning until the end no matter big or small.

ABSTRAK

Serat sabut kelapa boleh digunakan sebagai bahan untuk meningkatkat kualiti bata simen jika digunakan dengan betul. Kajian ini bertujuan untuk menyiasat sifat bata yang dicampurkan dengan serat sabut kelapa. Kesan penambahan serat sabut kelapa ke atas kekuatan mampatan, kekuatan lenturan dan penyerapan air bata akan dikaji.Serat kelapa adalah antara serat semulajadi yang paling mulur. Serat kelapa mampu adalah 4-6 kali lebih kuat berbanding serat lain. Sampel bersaiz 210mm x 100mm x 65mm disediakan untuk 7, 14 dan 28 hari. Sampel tersebut akan mengandungi 0%, 2%, 4%, dan 6% serat sabut kelapa. Kekuatan mampatan dan kekuatan lenturan meningkat dengan tinggi apabila 4% serat kelapa dicampur ke dalam bata. Sebagai kesimpulan, serat sabut kelapa boleh digunakan untuk meningkatkan kualiti bata simen.

ABSTRACT

Coconut Husk Fiber can be use as material to increase the quality of concrete brick if used properly. This research is to investigate the properties of brick when coconut husk are mixed as material. The effect of the coconut husk fiber amount on the compressive strength, flexural strength and water absorption will be investigated in this research. Coconut fibre amongst all natural fibres is the most ductile. Coconut fibres have the capacity of taking strain 4-6 times more than that of other natural fibres. Sample with size 210mm x 100mm x 65 mm were cast and tested at 7, 14 and 28 days. The sample consist of 0%(control), 2%, 4% and 6% coconut husk fiber content. There is an increase in compressive and flexural strenght for 4% and below percentage of coconut husk fiber. In conclusion, coconut husk fiber can be use as material to increase the quality of concrete brick.

TABLE OF CONTENT

DECLARATION

TITLE PAGE

ACKNOWLEDGEMENTS ii

ABSTRAK iii

ABSTRACT iv

TABLE OF CONTENT v

LIST OF TABLES vii

LIST OF FIGURES viii

CHAPTER 1 INTRODUCTION

1.1 Background 1

1.2 Problem Statement 2

1.3 Objective 2

1.4 Scope of Study 3

1.5 Significance of Study 3

CHAPTER 2 LITERATURE REVIEW

2.1 INTRODUCTION **Error! Bookmark not defined.**

2.2 Type of Brick **Error! Bookmark not defined.**

2.2.1 Common Burnt Clay Brick **Error! Bookmark not defined.**

2.2.2 Sand Lime Brick **Error! Bookmark not defined.**

2.2.3 Engineering Brick **Error! Bookmark not defined.**

2.2.4 Concrete Brick 5

2.3 Coconut Husk Fiber 5

2.4 Type of Strength 5

2.4.1 Compressive Strength 5

2.4.2 Flexural Strength 6

2.5 Water Absorption Test 6

CHAPTER 3 METHODOLOGY

3.1 Introduction 7

3.2 Flow of Works 8

3.3 Preparation of Materials 9

3.3.1 Ordinary Portland Cement 9

3.3.2 Sand 9

3.3.3 Water 10

3.3.4 Coconut Husk Fiber 10

3.4 Mix Proportion 11

3.5 Brick Design 12

3.6 Mould Design 12

3.7 Mixing Procedure 13

3.8 Curing 13

3.9 Testing Method 14

3.9.1 Compressive Strength 14

3.9.2 Flexural Strength 15

3.9.3 Water Absorption 16

CHAPTER 4 RESULTS AND DISCUSSION

4.1	Introduction	17
4.2	Compressive Strength Result	18
4.3	Flexural Strength Result	20
4.4	Water Absorption Result	24

CHAPTER 5 CONCLUSION

5.1	Introduction	25
5.2	Conclusion	25
5.3	Recommendation	26
REFERENCES		**27**

LIST OF TABLES

Table 3.1	Mix proportion	11
Table 4.1	Compressive Strength For 7 days Curing Period	18
Table 4.2	Compressive Strength For 14 days Curing Period	19
Table 4.3	Compressive Strength For 28 days Curing Period	20
Table 4.4	Flexural Strength For 7 days Curing Period	21
Table 4.5	Flexural Strength For 7 days Curing Period	22
Table 4.6	Flexural Strength For 14 days Curing Period	23
Table 4.7	Water Absorption Test	24

LIST OF FIGURES

Figure 3.1	Portland Cement	9
Figure 3.2	Sand	10
Figure 3.3	Coconut Husk Fiber	11
Figure 3.4	Brick	12
Figure 3.5	Mould	12
Figure 3.6	Work Flow for Mixing	13
Figure 3.7	Mixing Process	13
Figure 3.8	Water Curing	14
Figure 3.9	Compressive Strength Test	15
Figure 3.10	Flexural Strength Test	15
Figure 3.11	Water Absorption Test	16
Figure 4.1	Compressive Strength For 7 days Curing Period	18
Figure 4.2	Compressive Strength For 14 days Curing Period	19
Figure 4.3	Compressive Strength For 28 days Curing Period	20
Figure 4.4	Flexural Strength For 7 days Curing Period	21
Figure 4.5	Flexural Strength For 14 days Curing Period	22
Figure 4.6	Flexural Strength For 28 days Curing Period	23
Figure 4.7	Water Absorption For 28 days Curing Period	24

CHAPTER 1

INTRODUCTION

1.1 Background

Even though there are many advanced technologies in construction industry such as reinforced concrete, steel structure and Industrial Building System, brick are still use as important material in some construction. Brick is a building material used in constructing wall, pavement and sometimes column.

There are many type of brick used in construction. The types are common burnt clay brick, sand lime brick, engineering brick, concrete brick and fly ash clay brick. Common burnt clay brick are made by pressing clay in moulds. Then it is dried and burn in a kiln. This brick are reddish in colour. Sand lime brick are made from sand, fly ash and lime mixed together. After it is mixed, the mix is moulded under pressure to make the brick. The brick are gray in colour. Engineering brick are manufactured at very high temperature causing it to become dense and strong. Concrete bricks are made from concrete. Fly ash clay brick are manufactured from clay and fly ash at 1000 degrees celcius.

Bricks are chosen as construction material for many reasons. The first one is aesthetic. Brick has variety of colour and textures. It also has excellent compressive strength. Brick is also good for insulation. It is used to help maintain interior temperature and save energy. A brick structure can have 6 hour maximum fire protection rating if prepared

Malaysia produced a lot of natural waste material from industry and agriculture. The waste can be reduced by recycling them into materials for building construction. In this research, coconut husk fibers are used as additive material to reinforced brick.

1.2 Problem Statement

The demand of concrete brick increase as the construction industry grows. A lot of concrete brick are use in many constructions. High usage of bricks increases the cost of construction. New type of environmental friendly and cheaper brick is required to reduce construction cost and take care of the environment.

Waste from agricultural industry can be use to increase the strength of concrete brick. The material can be found easily, environmental friendly and cheap. The natural fiber in the coconut husk has potential to improve the properties of the concrete brick to create better quality brick at less cost.

To find a solution to the situation, a study to investigate the effect of using coconut husk as additive material in concrete brick. Use of coconut husk fiber will lower the cost of construction, reduce environmental problem and optimize the use of waste material.

1.3 Objective

i. To study the effect of increasing percentage of coconut husk fiber as material on compressive strength of bricks
ii. To determine the effect of increasing coconut husk fiber on the flexural strength of bricks
iii. To investigate the effect of coconut husk fiber as additive material on the water absortion of brick

1.4 Scope Of Study

The coconut fibers are used as material for the purpose of strengthening the brick mechanical properties. It will be use as partial sand replacement in the bricks sample of 1:5 cement to sand ration brick. The brick will undergo water curing for 7, 14 and 28 days.

The bricks sample will be tested for compressive strength, flexural strength and water absorption test. The sample contain 2%, 4% and 6% of coconut husk fibers. Compressive strength and flexural strength are tested on day 7^{th} , day 14^{th} and day 28^{th} of curing and water absorption of the sample are tested on day 28^{th}.

1.5 Significance of study

This study will help us to reduce the waste product from agriculture industry by recycling it for better use. If we can recycle the waste, we can reduce the pollution of the environment and help keep the earth clean. We also may be able to reduce the cost of construction material by using recycled waste product to replace part of it.

REFERENCES

Olanipekun et al., (2006); Nor et al., (2010)

Noor Md. Sadiqul Hasan, al, (2012). The Use of Coconut Fibre in the Production of Structural Lightweight Concrete.

Mulinari, D.R., C.A.R. Baptista, J.V.C. Souza and H.J.C. Voorwald, 2011. Mech properties of coconut fibers reinforced polyester composites. Procedia Eng., 10: 2074-2079

Gunasekaran, K. and P.S. Kumar, 2008. lightweight concrete using coconut shells as aggregate. Proceedings of International Conference on Advances in Concrete and Construction, February 7-9, 2008, Hyderabad, India, pp: 450-459 4